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ON LINE DATABASES: WPI and CLAIMS

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(54) Protecting ducts against fire

(57) A duct (1) is protected against the effects of internal or external fires by a support structure (2) provided about the duct (1) along its length which supports sheets (8) of a fire resistant material. Thermal insulation can be provided between the support structure (2) and the duct (1). Support (2) may be in the form of a plurality of sets of channel members spaced apart around the duct and extending along its length with sheets (8) engaging with the members. Sheets may be of Fyreline 19 (RTM). Duct is typically a cable tray, service shaft or ventilation duct.

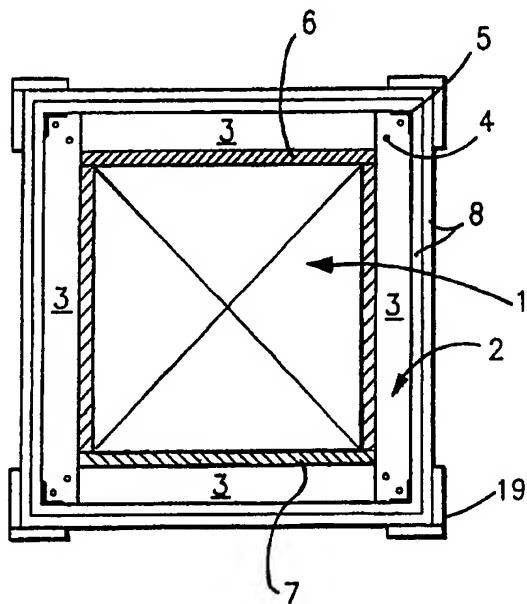


FIG. 1.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1990.

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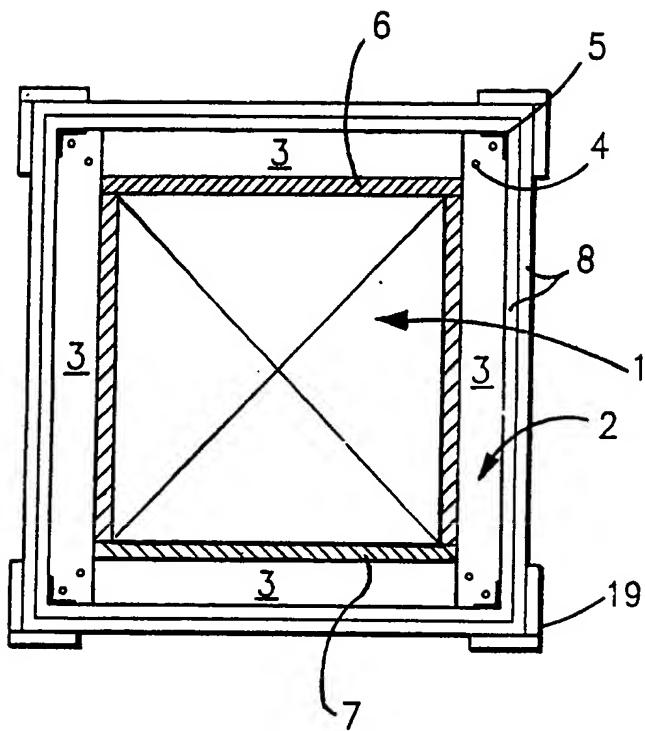


FIG.1.

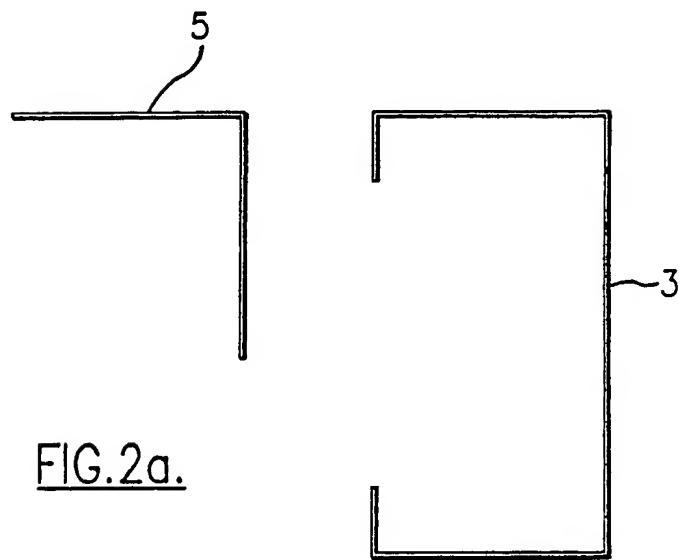


FIG.2a.

FIG.2b.

13 + 2 95

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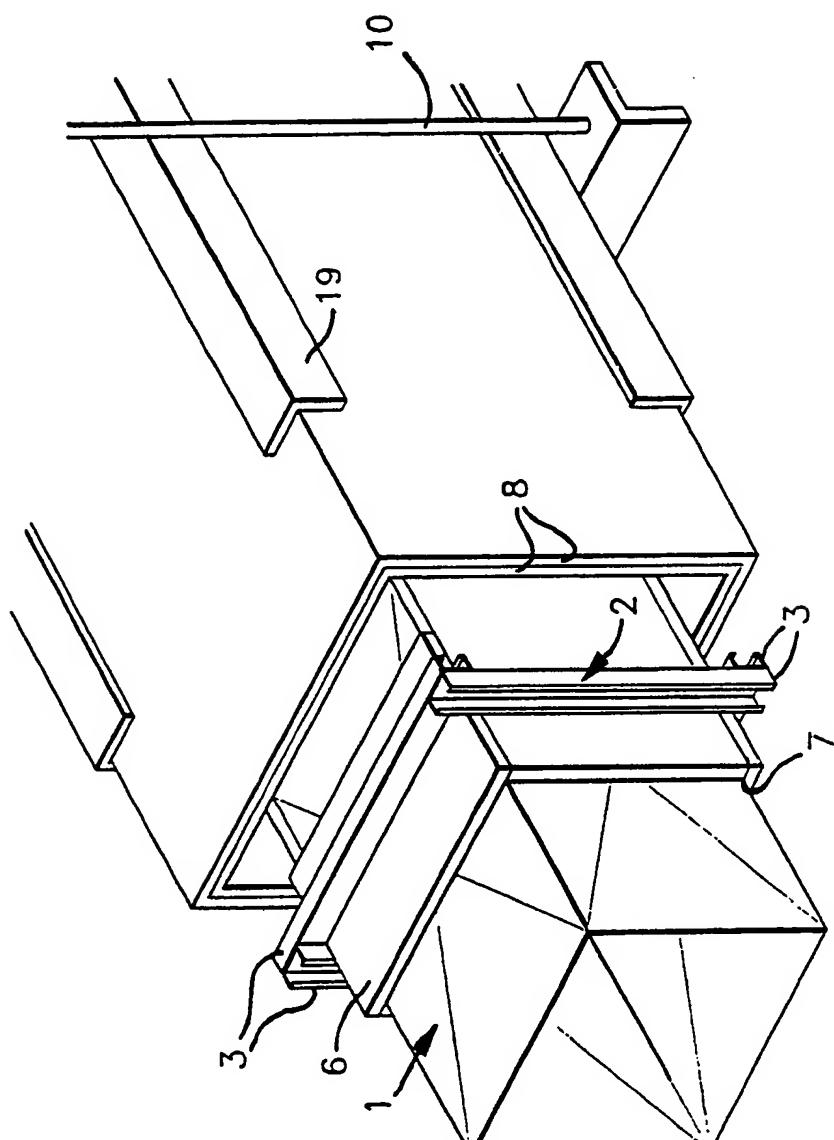
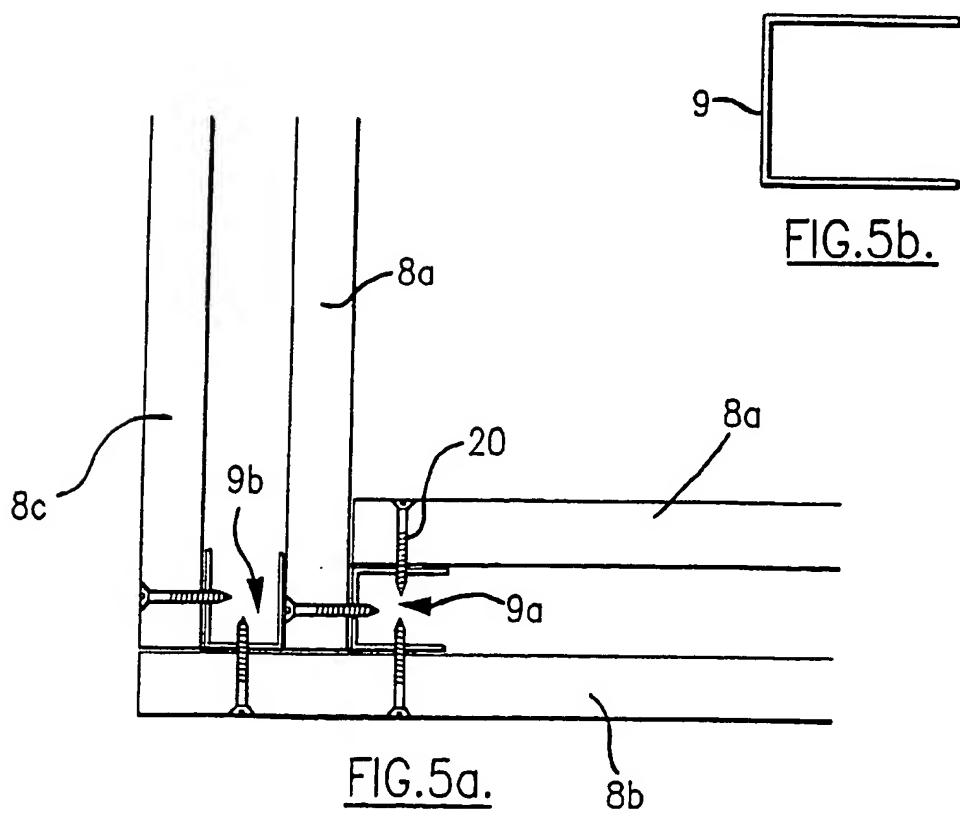
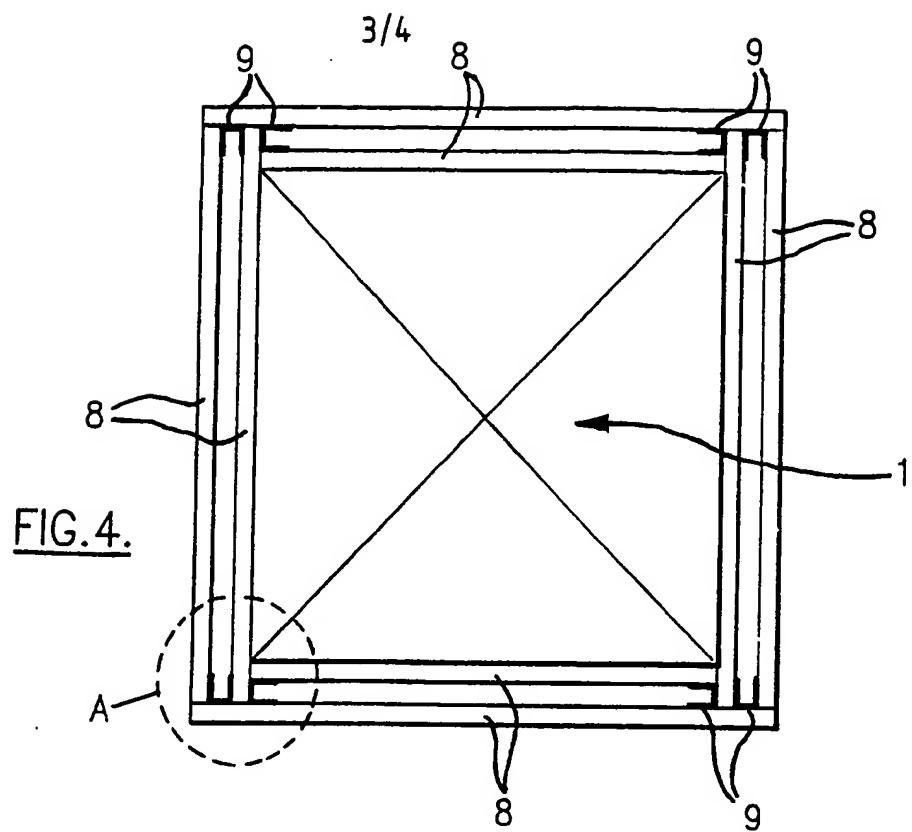


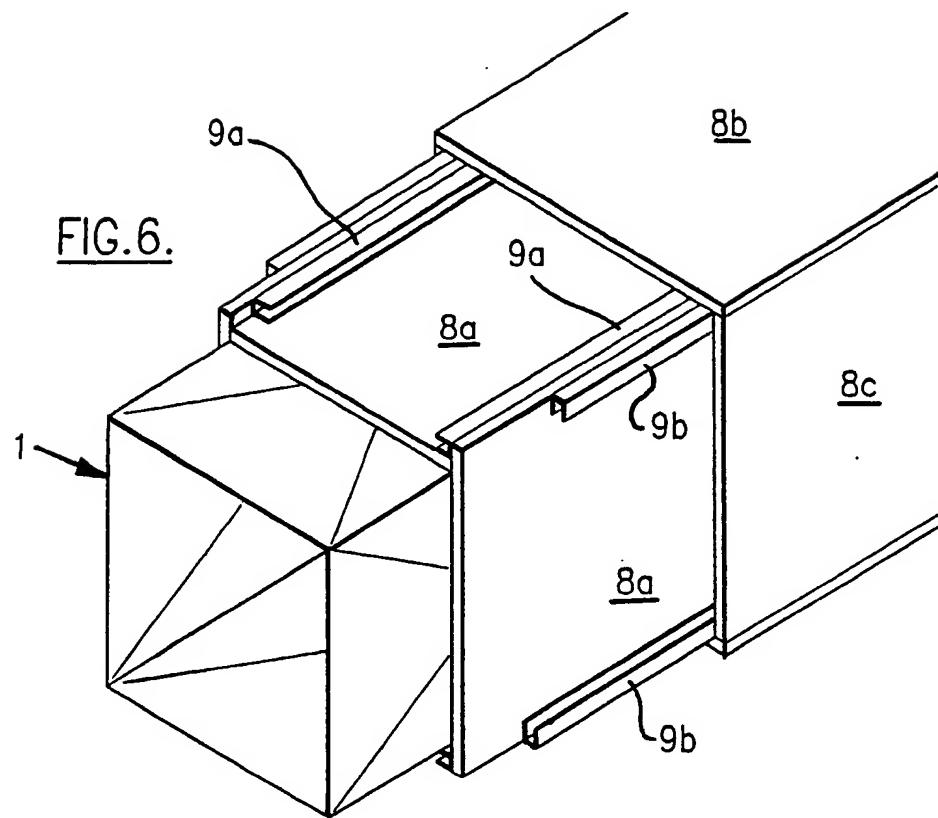
FIG. 3.

16 +2 95

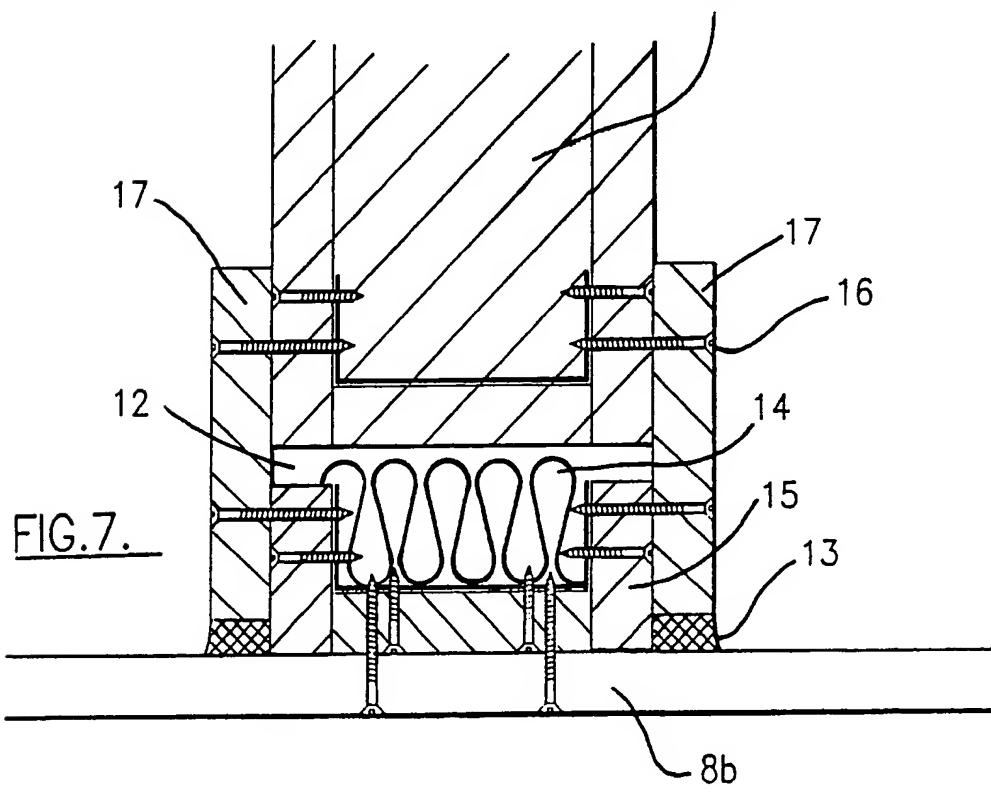


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DUCT PROTECTIONFIELD OF THE INVENTION

The present invention relates to improvements in and relating to the protection of ducts in buildings.

The term "duct" includes, for the purposes of this specification, service shafts, cable trays and other such service housings provided in buildings.

More particularly, the present invention relates to the fire protection of ducts and especially those ducts forming part of a ventilation system.

For simplicity, the present invention will be hereinafter described in respect of its use in the fire protection of ventilation ducts but it will be appreciated by those skilled in the engineering arts that other uses can be appropriate.

BACKGROUND TO INVENTION

In the construction of buildings, ventilation ducts will typically be provided enabling the entry and exhaust of air for the air-conditioning and will be interlinked with smoke exhaust ducts for example.

A problem with having such ducts extending through a building is that they provide a route for the transference of a fire throughout the building.

To the present time various proposals have been put forward in respect of the cladding of ducts in achieving some fire protection for them. However, such previous proposals have tended to be complicated and/or required the use of expensive insulation material. Additionally, some proposals have not provided fire resistance in both directions namely in controlling a fire within the duct from breaking out of the duct or a fire outside the duct assembly from breaking into the duct.

It is thus an object of the present invention to provide a method and/or system for the fire protection of a duct which will overcome or at least obviate disadvantages in proposals to the present time or at least will provide the public with a useful choice.

Further objects of this invention will become apparent from the following description.

SUMMARY OF THE INVENTION

According to one aspect of the present invention there is thus provided a method of providing fire resistance for a duct, said method comprising:

- (i) providing a sheet support means to extend about the external surface of the duct;
- (ii) connecting fire resistant sheet material with said support means so as to surround said external surface of said duct and to provide protection against the effects of fire internally or externally of the duct.

According to a further aspect of the present invention there is provided a method as above defined wherein said sheet support means comprises a plurality of sets of support members interconnected to form spaced apart supports along the length of said duct and wherein said fire resistant sheet material is connected to the outside of said supports.

According to a further aspect of the present invention a method as defined in the paragraph preceding that immediately above is provided in which said sheet support means comprises a plurality of channel members spaced apart around the duct and extending along its length and wherein said fire resistant sheet material is engaged with said channel members.

According to a still further aspect of the present invention a method of providing fire resistance for a duct comprises the steps of positioning fire resistant material about a duct substantially as herein described

with reference to any one of the embodiments shown in the accompanying drawings.

According to a still further aspect of the present invention there is provided a fire protection system for a duct, said system comprising a fire resistant sheet material support means positionable about said duct for which fire protection is required, said support means being adapted so as to surround the external surface of said duct and to support fire resistant sheet material to provide resistance against the effects of fire internally or externally of the duct.

According to a further aspect of the present invention there is provided a system as immediately above defined wherein said sheet support means comprises a plurality of sets of support members interconnected to form spaced apart supports about the external surface of said duct along its length and adapted to receive and hold said fire resistant sheet material.

According to a still further aspect of the present invention there is provided a system as defined in the paragraph preceding that immediately above and wherein said sheet support means comprises a plurality of sets of channel members spaced apart around the duct along the length of the duct, which are adapted to receive and hold said fire resistant material.

According to a still further aspect of the present invention there is provided a system of providing fire protection for a duct substantially as herein described with reference to any one of the embodiments of the invention shown in the accompanying drawings.

Further aspects of this invention which should be considered in all its novel aspects will become apparent from the following description given by way of example of possible embodiments thereof and in which reference is made to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1: Shows diagrammatically a cross-sectional view through a fire resistant duct assembly according to one possible embodiment to the invention;

Figures 2a, Show cross-sectional views of possible
2b: metal members for use in the sheet support means of Figure 1;

Figure 3: Shows diagrammatically a perspective cross-sectional view of the fire protected duct of Figure 1;

Figure 4: Shows diagrammatically a cross-sectional view of a fire resistant duct assembly according to a further embodiment to the invention;

Figure 5a: Shows diagrammatically an enlarged view of the area "A" of Figure 4;

Figure 5b: Shows a cross-sectional view of a channel member for use in the embodiment of Figures 4 and 5a;

Figure 6: Shows diagrammatically a perspective cross-sectional view of the fire protected duct of Figure 4; and

Figure 7: Shows diagrammatically a cross sectional view of a wall junction for a duct assembly of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring firstly to Figures 1 to 3 of the accompanying drawings, a metal duct 1 is required to be protected against the effects of both an internal or external fire. In some constructions it may be necessary to achieve what, in New Zealand at least, is called a two-way 2 hour Fire Resistance Rating (FRR). It will be appreciated however by those skilled in the building construction arts that different FRRs can be achieved while using the present invention, by varying the use of specific materials and/or their thicknesses. In the particular construction illustrated in Figures 1 and 3 particularly, a metal, suitably steel, surround or ring 2 is provided about the duct 1. The surround 2 may consist of a plurality of metal channel members 3 which

may as shown be positioned back to back and interconnected at their respective ends by screws or the like 4. An integral, as opposed to an interconnected, surround may alternatively be provided. A continuous steel angle 5 may also be provided so as to extend between the interconnected members 3. The members 3 will provide a ring or support structure at spaced apart intervals, for example at 500mm intervals, along the length of a duct 1. A strip 6 such as of a fire resistant sheet material may be positioned as shown underneath the top member 3 of each of the rings 2 so as to act as a spacer member.

Thermal insulation 7 may be provided about the duct 1 between its spacing with the surround 2. This insulation 7 may for example comprise FIBRETEX-450 (trade mark) although such insulation material may be omitted depending on the required FRR.

Connected about the ring 2, as shown in Figure 3, are one or more, two being shown, layers of a fire resistant sheet material 8, such as FYRELIN 19 (trade mark) or the like. The sheets 8 may, as shown, be butt jointed to the ring or surround 2 and a continuous capping member 19 may be provided to extend along the respective corners of the external sheets 8. An external support hanger arrangement 10 is shown provided

for the duct assembly positioned along the length of the duct 1 at appropriate spacings.

The duct protection arrangement of Figures 1 to 3 may be particularly suitable for ducts up to 1200mm square. It is seen that the present invention enables the use of a relatively low cost fire resistant sheet material, such as FYRELINE 19 (trade mark), in a simple yet effective construction providing two way protection for the duct.

Referring now to Figures 4 to 6 of the accompanying drawings, corresponding numerals will be used where appropriate in describing a fire protection system for a duct 1 which is particularly suitable for ducts of a smaller cross section for example of the order of 600mm square.

One or more layers 8 of fire resistant sheet material, two being shown, are positioned about the duct 1 so as to surround it, the inner and outer boards being held by a surround consisting of interconnected channel members 9 which are shown in greater detail in Figures 5a and 5b. In Figure 5a, the area "A" of Figure 4 is shown in greater detail. It is seen that at each corner about the duct 1 a first channel member 9a provides a mounting support by means of screws 20 for inner boards 8a and an outer board 8b. The second channel member 9b

is then shown providing additional support for the outer board 8b and a second outer board 8c. The channel members 9, such as shown in Figures 5a and 5b, may comprise continuous lengths of channel section galvanised mild steel for example. It is seen that by providing just a pair of channel members 9a, 9b at each corner, a pair of fire resistant boards 8 can be secured in position along each side of the duct 1. A hanger arrangement (10) (not shown), such as illustrated in Figure 3, can be provided to support the ducting assembly shown in Figure 6, spaced apart at appropriate intervals along the length of the ducting system.

It is envisaged that additional insulation could be provided in the cavity between the respective boards 8 if required depending on the FRR sought to be achieved.

Again it is seen that by the use of relatively low cost fire resistant board such as FYRELINE 19 (trade mark) a simple yet effective two way fire resistance can be provided for a duct.

While the use of metal components for the board material support members 2, 9 etc. has been mentioned it is to be appreciated that ceramic or other heat resistant components could alternatively be used.

While protection has been provided about all four sides, when the duct 1 is positioned beneath a concrete slab for example, three sided protection will be all that may be required, while for a duct extending between a floor and ceiling, two sided protection may be all that is necessary.

Referring now to Figure 7, a wall junction for a continuous duct assembly of the present invention is shown diagrammatically. The outer board 8b of one side of the duct assembly of Figure 6 is shown extending through the aperture 12 provided in a wall 18. Appropriate fixing means 16 are then shown connecting a pair of outer sheets 17 of a suitable board material such as FYRELIN 19 (trade mark) to the wall 18 about the opening 12 with additional inner boards 15 being connected both to the outer board 17 and the outer board 8b. Insulation such as FIBRETEX-450 (trade mark) or the like 14 is shown providing packing in the cavity and a sealant 13 such as FLAMEX ONE (trade mark) or FYREFLEX (trade mark) or the like is shown provided between the bottom edges of the outer board 17 and the outer board 8b. It is seen that the boards 17 may be adjustable so as to accommodate different size wall openings 12.

Where in the foregoing description, reference has been made to specific components or integers of the invention having known equivalents, then such

equivalents are herein incorporated as if individually set forth.

Although this invention has been described by way of example and with reference to possible embodiments thereof, it is to be understood that modifications or improvements may be made thereto without departing from the scope of the invention as defined in the appended claims.

CLAIMS:

1. A method of providing fire resistance for a duct, said method comprising:
 - (i) providing a sheet support means to extend about the external surface of the duct;
 - (ii) connecting fire resistant sheet material with said support means so as to surround said external surface of said duct and to provide protection against the effects of fire internally or externally of the duct.
2. A method as claimed in Claim 1 wherein said sheet support means comprises a plurality of sets of support members interconnected to form spaced apart supports along the length of said duct and wherein said fire resistant sheet material is connected to the outside of said supports.
3. A method as claimed in Claim 2 wherein said sheet support means comprises a plurality of sets of channel members spaced apart around the duct and extending along its length and wherein said fire resistant sheet material is engaged with said channel members.
4. A method of providing fire resistance for a duct substantially as herein described with reference to

Figures 1 to 3, Figures 4 to 6 or Figures 4 to 7 of
the accompanying drawings.

5. A fire protection system for a duct comprising a fire resistant sheet material support means positionable about said duct for which fire protection is required, said support means being adapted so as to surround the external surface of said duct and to support fire resistant sheet material to provide resistance against the effects of fire internally or externally of the duct.
6. A fire protection system for a duct as claimed in Claim 5 wherein said support means comprises a plurality of sets of support members interconnected to form spaced apart supports along the length of such duct and wherein said fire resistant sheet material is connected to the outside of said supports.
7. A fire protection system as claimed in Claim 5 wherein said sheet support means comprises a plurality of channel members spaced apart around the duct and extending along its length, which channel members are adapted to receive and hold said fire resistant sheet material.

8. A fire protection system as claimed in Claim 6 wherein said support members each comprise channel members extendable along a respective side of said duct, said channel members being interconnectable at their free ends so as to form a respective said support, one or more sheets of said fire resistant sheet material being positioned about said supports to be supported thereby.
9. A fire protection system as claimed in Claim 7 wherein said channel members extend along the length of the duct at respective corners thereof and have secured thereto along opposite flanges of their respective channels a pair of spaced apart sheets of said fire resistant material.
10. A fire protection system for a duct as claimed in any one of Claims 5 to 9 wherein fire resistant insulation is provided within one or more spacings provided about said duct.
11. A fire protection system for a duct substantially as herein described with reference to Figures 1 to 3, Figures 4 to 6 or Figures 4 to 7 of the accompanying drawings.

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| Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report) | | Application number GB 9424330.0 |
| Relevant Technical Fields | | Search Examiner M R WENDT |
| (i) UK Cl (Ed.N) A5A (A5,A22,A23,A31) H2C (CCL,CCM) E1D (DF113,D142) F4V (VGBR) | | |
| (ii) Int Cl (Ed.6) A62C 2/06, 3/00, 3/16. H02G 3/04 | | Date of completion of Search 15 MARCH 1995 |
| Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. | | Documents considered relevant following a search in respect of Claims :- 1-11 |
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|----------|--|--|----------------------|
| X | WO 93/22814 A1 | (B & K) see Figure 1, Claims 1 and 2. Abstract. Page 7 lines 16 etc | 1,5 |
| A | EP 0091255 A2 | (3M) see Figures 8 and 9, Claim 1, Example 1 | |
| X | US 4585070 | (GARRIDO) see Claim 1, Figure 1, column 2 lines 24-44 | 1,5 |
| X | US 4276332 | (CASTLE) see Claim 1, Figure 1 | 1,5 |

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